



NATIONAL RADIO ASTRONOMY OBSERVATORY

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INTERNATIONAL BUREAU SEEKS FURTHER COMMENT ON QUALCOMM PETITION FOR RULEMAKING (RM-11640)

Comments of the National Radio Astronomy Observatory Charlottesville, VA 22903

Introduction

1. Here, the National Radio Astronomy Observatory (NRAO) responds to the Commission's request for further comment regarding Qualcomm's Petition for Rulemaking to operate an Air-To-Ground (ATG) service in the Ku-band at 14.0 – 14.5 GHz, see RM-11640.
2. The band 14.47 – 14.5 GHz is allocated on a secondary basis to the radio astronomy service (RAS), subject to US 203 and US 342. Regarding the band 14.47 – 14.5 GHz, US 342 states that "... all practicable steps shall be taken to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service ... " US 203 and the current list of sites conducting regular observations in the Ku-band are addressed in Annex A below.
3. NRAO (<http://www.nrao.edu>), operated by Associated Universities, Inc. (AUI), (<http://www.aui.edu>) under a cooperative agreement with the National Science Foundation (NSF), is the largest observatory dedicated to radio astronomy and one of the largest astronomical observatories in the world. NRAO operates one dozen radio astronomy stations in rural and remote regions of the United States that stand to be affected by the proposed ATG operations. University and other radio astronomy observatories not affiliated with NRAO also operate in the band.

Comment

4. Qualcomm's suggested mechanism for achieving compatibility with operations of the Radio Astronomy Service (RAS) is to enter into a coordination agreement with NSF as described in the Petition at II.B.1, A.3.3.7 and footnotes 43 and 53. Coordination agreements between the NSF and various AMSS and VMES operators in the Ku-band are already in operation, as noted in footnote 53 of the Petition. For ATG, exclusion zones would be created around RAS sites during periods of RAS operation in the band.
5. NRAO is favorably disposed to such coordination as a means of sharing the Ku-band but ATG operations differ considerably from those that have been previously

coordinated and may be expected to present a more challenging sharing scenario. In particular:

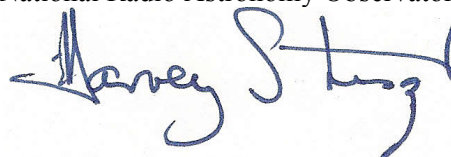
- a) ATG operations would have downlinks into the RAS band while previously-coordinated AMSS and VMES operations are uplinks. Therefore the interfering signal from ATG would likely be stronger at RAS sites. Spurious emissions into the RAS band by ATG operations and aggregation of ATG signals would need to be studied in more detail. Based on such studies additional restrictions to ATG operations may be necessary.
- b) ATG operations require the construction of hundreds of ground stations whose locations would need to be coordinated prior to construction, to minimize direct interference from uplinks and to prevent ATG downlinks from directly illuminating RAS sites.

Summary of concerns for Ku-band sharing between ATG and RAS

- 6. There are significantly more issues to be addressed with ATG than with AMSS operations and coordination through NSF is thus absolutely necessary to protect RAS.

Respectfully submitted,

National Radio Astronomy Observatory



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Annex A**US 203 and the list of RAS sites currently operating in the band 14.47 – 14.5 GHz**

US 203 that purports to list RAS sites operating at 14.47 – 14.5 GHz is deserving of renovation. Sites currently operating at Ku-band are contained in Table A.1 below:

Site	N. lat.	W. long.	Site	N. lat.	W. long.
National Radio Astronomy Observatory (NRAO), Robert C. Byrd Green Bank Telescope, Green Bank, WV	38° 25' 59"	79° 50' 23"	VLBA Brewster, WA	48° 07' 52"	119° 41' 00"
NRAO Very Large Array, Socorro, NM	34° 04' 44"	107° 37' 06"	VLBA Fort Davis, TX	30° 38' 06"	103° 56' 41"
Caltech Telescope, Owens Valley, CA	37° 13' 54"	118° 17' 36"	VLBA Hancock, NH	42° 56' 01"	71° 59' 12"
			VLBA Kitt Peak, AZ	31° 57' 23"	111° 36' 45"
			VLBA Los Alamos, NM	35° 46' 30"	106° 14' 44"
			VLBA Mauna Kea, HI	19° 48' 05"	155° 27' 20"
			VLBA North Liberty, IA	41° 46' 17"	91° 34' 27"
			VLBA Owens Valley, CA	37° 13' 54"	118° 16' 37"
			VLBA Pie Town, NM	34° 18' 04"	108° 07' 09"
			VLBA Saint Croix, VI	17° 45' 24"	64° 35' 01"

Table A.1